

Transforming the National Park System

“Present-day management of nature in the parks differs substantially from that in the early decades of national park history—the most fundamental difference being the degree to which science now informs the Service’s natural resource practices.”

—Richard West Sellars
Preserving Nature in the National Parks: A History

Since its inception in 1999, the Natural Resource Challenge has garnered an approximate increase of \$76 million in base funding for natural resource management and research in the national parks. The Challenge is greatly helping to transform the Service into a modern and more effective bureau for the preservation of park natural resources. As reported in this chapter and throughout this publication, the Challenge has enabled NPS participation in Cooperative Ecosystem Studies Units and the establishment of monitoring networks, research learning centers, Exotic Plant Management Teams, and other important institutions. Together they are building knowledge of the parks, increasing the effectiveness of resource management strategies, engaging accomplished scientists in park research, and capturing the interest of the public in the requirements for long-term preservation of our national treasures. The articles reflect this exciting evolution and document positive trends in the care of the parks for the future.



National Park Service Director Fran Mainella cuts the symbolic “last” melaleuca tree in Big Cypress National Preserve, Florida, as forestry technician Billy Snyder looks on at a ceremony held February 4, 2003. Over a period of nearly 20 years the National Park Service and its partners battled the invasive plant species, treating approximately 14 million trees and bringing the species to a level that can now be maintained.

Nonnative melaleuca under control at Big Cypress National Preserve

By William A. Snyder, Antonio J. Pernas, and James N. Burch

IN 2003, BIG CYPRESS NATIONAL PRESERVE achieved a major victory in its 19-year battle with the exotic plant *Melaleuca quinquinervia* by completing the initial treatment of all known populations within the preserve. Melaleuca, a native of Australia, was introduced into Florida in 1906 as an ornamental. In the 1930s it was planted extensively to create forests in the swamps. It grows rapidly and produces dense monocultures that displace native plant communities and provide little food for wildlife.

On February 4, National Park Service Director Fran Mainella was on hand to cut the symbolic last melaleuca near preserve headquarters in Ochopee, Florida. “The National Park Service has been treating melaleuca since 1984 and has dealt with about 14 million stems at last count,” Mainella said. “We know this war will go on but we are marking a major victory in the initial effort to eradicate this difficult exotic species.”

Recognizing the need to join forces to stop the damaging impacts of melaleuca and other exotics, a group of resource managers in concert with land management agencies, research scientists, industry, and

“[Melaleuca] grows rapidly and produces dense monocultures that displace native plant communities and provide little food for wildlife.”

other interested groups formed the Florida Exotic Pest Plant Council (FLEPPC) in 1984. The council prioritized exotic pest plants in order to begin developing species-based management plans that incorporated tactical elements, priorities for funding, and strategies for tackling the broader issues of controlling these species. Those early efforts paved the way for an integrated pest management approach initiated in 1984 at Big Cypress and have resulted in the treatment of more than 14 million melaleucas at a cost of \$3.5 million.

In Big Cypress National Preserve, annual systematic reconnaissance flights revealed that melaleuca reached the height of its infestation in 1992. The tree species at varying densities occupied 186 square miles (482 sq km) of sensitive wetlands within the preserve. The main goal of treatment was not eradication, but rather bringing melaleuca to a maintenance level, a goal that has now been achieved. That is not to say there is no longer any melaleuca in the preserve. On the contrary, treatments and reconnaissance will continue in perpetuity, as seed sources occur throughout this part of Florida. Also, several problematic invasive plants still occur and have yet to be fully addressed. Brazilian pepper (*Schinus terebinthifolius*) occupies more than 1 million acres (405,000 ha) in southern Florida. And perhaps the most serious threat yet, Old World climbing fern, imported from Southeast Asia, is spreading unabated throughout the greater Everglades ecosystem.

exotic plant management

At the height of its infestation more than a decade ago, melaleuca stands infested some 186 square miles (482 sq km) of sensitive wetlands in Big Cypress National Preserve. An integrated pest management program involving many partners was critical to the success of reducing the invasive species to maintenance levels.



The control of melaleuca within Big Cypress National Preserve would not have been possible without a commitment from preserve management, FLEPPC, the Florida Department of Environmental Protection, South Florida Water Management District, Miami-Dade County, the U.S. Department of Agriculture, the Florida/Caribbean Exotic Plant Management Team, and many volunteers. This model of partnerships used in controlling melaleuca was transformational to Big Cypress National Preserve and shows that with commitment we can combat harmful invasive plants and continue to preserve our nation's natural heritage. ■

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Exotic Plant Management Teams: An update on the successful model in action

By Linda Drees

EXOTIC PLANTS INFEST approximately 2.6 million acres (1,052,220 ha) in the National Park System, reducing the natural diversity of these places. With funding from the Natural Resource Challenge, the National Park Service has established rapid-response Exotic Plant Management Teams (EPMTs) to control exotic plants. Modeled after wildland firefighting strike teams, EPMTs deploy highly trained, mobile forces of plant management specialists who assist parks in controlling exotic plants.

Each of the 16 EPMTs serves multiple parks within a broad geographic area. They work through steering committees to identify, develop, conduct, and evaluate the removal of exotic species, and undertake appropriate native species restoration efforts. Each team has developed site-specific strategies for combating exotic plants that reflect the needs and resources of the parks they serve.

“In 2003 seven ... new teams joined nine established teams, increasing the number of parks getting professional plant control to 219.”

The teams continued to make substantial progress in the control of harmful invasive plants on parklands in 2003. Seven teams were deployed during the summer. These new teams joined nine established teams, increasing the number of parks getting professional plant control to 219. In FY 2003 they inventoried exotic plants on more than 619,000 acres (250,695 ha), and found gross infestation of weeds on 518,898 acres (210,154 ha), which they treated. Since their inception in 2000, the teams have controlled at least 12 exotic plant species to a maintenance level.

The success of the EPMTs comes from their ability to adapt to local conditions and needs. Each team employs local experts and sets its own work priorities based on various factors: severity of threat to high-quality natural areas and rare species, extent of targeted infestation, probability of successful control and potential for restoration, opportunities for public involvement, and park commitment to follow-up monitoring and treatment.

Adaptive management is a critical part of the EPMT response. As the teams have grown, program managers have recognized the need for increased capability in setting priorities for control and restoration. As a result, the program, in conjunction with the Colorado Plateau Cooperative Ecosystem Studies Unit and the Intermountain Region restoration ecologist, is developing a tool, which will be available in two years, to set priorities for control. Additionally, in order to improve the assessment of technologies used for control, the team in southern Florida is collaborating with the NPS Environmental Quality Division and regional parks to develop a landscape-scale



Invasive plant species are difficult to control not only for their abundance in many national parks but also because of other challenges such as inaccessibility.

environmental impact statement for vegetation management. This is the first such effort for vegetation management in the National Park System and serves to streamline compliance actions. Parks in the Great Plains EPMT geographic area are conducting similar landscape-scale compliance.

Teams share operational information with private- and public-sector organizations, which have reviewed the NPS EPMT model with interest, studying and adopting aspects of the model. For example, in August 2003 at the Heinz Center workshop on invasive species databases, the fundamentals of the Alien Plant Control and Management Database (APCAM) were highlighted.

Through partnerships the National Park Service has leveraged more than \$2.8 million toward control of invasive plants. For example, collaboration with the University of Florida and the U.S. Department of Agriculture addresses impacts of invasive nonnative agricultural plants in natural areas of the U.S. Virgin Islands. A new program with



In 2003 the California Exotic Plant Management Team controlled pampas grass (*Cortaderia jubata*) growing on the Wildcat Cliffs of Point Reyes National Seashore, an effort that required climbing skills and careful attention to safety.

Natural Resource Challenge evaluated favorably by OMB

By Abigail Miller

The Natural Resource Challenge was one of the first government programs to be the subject of an Office of Management and Budget (OMB) requirement initiated in 2002. OMB's new Program Analysis Review Tool, or PART, was first applied to the Challenge in September 2002 for use in conjunction with development of the FY 2004 budget. The administration introduced this process to reform budget development by establishing a single tool for evaluating program performance and using the results as the basis for budgetary decisions. The PART score for 2002 was 72, considered very respectable. The process identified weaknesses in the NPS financial management system and the need for a comprehensive review of the Challenge by an objective party. A subsequent broadened review of the Natural Resource Stewardship and Science Directorate, which included the Natural Resource Challenge, was conducted in 2003 for the FY 2005 budget and resulted in an even higher draft score. Further information on PART and the 2002 evaluation is available from OMB's websites (<http://www.whitehouse.gov/omb/> [search on "PART"] and <http://www.whitehouse.omb/budget/fy2004/pma.html>). ■

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the Student Conservation Association uses "native plant corps," which will increase capabilities to control invasive plants and restore native species while training young professionals. In addition, through the Secretary of the Interior's Cooperative Conservation Initiative, several teams received grants to work with partners for invasive weed control to restore parklands.

It is a golden time for managing invasive species in national parks. Broad recognition from partners, visitors, and institutions indicates that invasive species are a major threat to our natural heritage. The increases in funding for invasive species management have certainly reflected this recognition and also demonstrated commitment. ■

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Environmental Quality Division's restoration program gains momentum

By Joe Carriero

LINDA CANZANELLI, superintendent at Biscayne National Park (Florida) for more than three years, has grown accustomed to vessel groundings at the National Park System's largest marine park. Canzanelli believes that the approximately 200 groundings reported each year represent only about 10% of the actual incidents on Biscayne's 165,000 submerged acres (66,825 ha). Unfortunately, most of the groundings occur on the park's vital seagrass habitat. "I think injuries to our seagrass beds will continue to increase," says Canzanelli. "As seagrass is stressed by natural changes and by human-created threats like pollution, sedimentation, and groundings, we are going to see a continual decline in this important ecosystem."

When motorized vessels run aground, propellers trench the bottom, uprooting seagrass, removing rhizomes, and displacing sediment. And when the grounded vessels attempt to power off, they often create deep blowholes. Such injuries are a concern because seagrasses at Biscayne (turtle grass—*Thalassia testudinum*—is the dominant species) provide many important benefits to the marine environment, including food and habitat for fish, invertebrates, birds, and endangered species like the West Indian manatee and several species of sea turtles.

A few years ago, resources injured at Biscayne and other parks would have been left to deteriorate. But now the National Park Service can use the Park System Resource Protection Act (16 U.S.C. 1911), passed in 1990, to pursue restoration to pre-injury conditions. Recently, Biscayne initiated seagrass restoration at three vessel grounding sites and Canzanelli is optimistic. She says, "My expectation is that the seagrass restoration projects will allow some of Biscayne's critical seagrass areas to survive."

An increasing number of restoration projects are now addressing injured resources across the National Park System. Parks are working with the Environmental Response, Damage Assessment, and Restoration (ERDAR) program office, part of the NPS Environmental Quality Division, to restore or replace critical wildlife habitat subjected to encroachments, vegetation fouled by oil spills, and seagrass beds and coral reefs injured by groundings.

Dan Hamson, chief of the ERDAR Branch, is enthused about the number of restoration projects now under way. He calls the Park System Resource Protection Act "a critical new tool for resource managers." "The 1911 statute lets us recover costs from parties who injure park resources," says Hamson. "This includes the cost of the immediate response to an incident, of the damage assessment, and of the restoration of the resources. If restoration is not feasible, we can recover the cost of replacing the resources or acquiring equivalent resources as compensation." Since the program began in 1993, the ERDAR Branch has helped settle dozens of cases, resulting in the collection of more than \$16 million for restoration or replacement of injured resources.

The branch includes experts who manage different phases of the complex restoration cases. The Damage Assessment Unit, headed by

ERDAR



Healthy turtle grass (above), the most common seagrass species at Biscayne National Park, contrasts dramatically with areas disturbed by powerboats. Legislation passed in 1990 enables the National Park Service, through its Environmental Response, Damage Assessment, and Restoration program, to recover costs for restoring the damaged marine habitat. Current projects at the park include restoring trenches (right) caused by motorboat propellers, and blowholes (below) created when stranded vessels "power off" shallows.



Rick Dawson in Atlanta, gets involved soon after the park's initial response to an incident. This unit appoints a case officer to help assess resource injuries, estimate the cost of restoration actions, and then work with a Department of the Interior solicitor and a Department of Justice attorney to develop and present the National Park Service's damage claim. Sometimes settlements are reached through litigation, but more often through negotiations with responsible parties.

During the assessment phase, ERDAR's Economic Support Unit, headed by Bruce Peacock, evaluates the ecological and human use services lost because of injuries to the resources. Peacock, an economist stationed in Ft. Collins, Colorado, determines the compensation value

George Dickison recognized for GIS contributions



The 2002 recipient of the Director's Award for Professional Excellence in Natural Resources is George Dickison, GIS and Information Resources Team Manager at the Alaska Support Office. As the leader of Alaska's GIS program, George had a vision to produce an integrated package of GIS

data, software tools, and data management procedures that would enable park staff to utilize GIS technology without requiring the assistance of GIS professionals, or as he puts it, "GIS in an other-duties-as-assigned atmosphere." Not only has he realized this vision for the Alaska parks, but also his team's software tools have become the National Park Service standard for the Inventory and Monitoring (I&M) Program and the fire management program.

When George joined the National Park Service 11 years ago, he assessed the GIS needs of the Alaska parks and refocused his team's efforts to meet those needs. He developed a creative approach for vegetation mapping that involved working with other agencies that had the same interests. Through partnerships with the I&M Program, FirePro Program, USGS EROS Alaska Field Office, Ducks Unlimited, the University of Alaska, and the National Wetlands Inventory, his team has completed more mapping in Alaska parks than has been accomplished in the rest of the National Park System combined.

The Alaska GIS team has won many awards, including the international ESRI Special Achievement Award as one of the outstanding GIS sites in the world. George and the GIS team have succeeded because they have built a program based on providing quality service to parks. According to George, "We have built a program, not a monument to a few talented individuals. Staff come and go. The measure of success is when you can survive staff turnover and continue to flourish with an ever-changing cast of characters. The Alaska program has done that. We have succeeded because we built a program based around quality service, a strong database focus, robust software development, and appropriate use of technology."

George was regional I&M coordinator for five years and his team now manages the Alaska I&M Program. He served on the national I&M steering committee, participating in the design of the program and contributing his much needed expertise to the huge challenge of developing data management strategies for the national program. He is active in natural resource management activities and also serves as chair of the Alaska Natural Resources Advisory Council. ■

of the lost resources either in dollars or in resource units such as acres of trees, square feet of sand beach, cubic meters of seagrass sediment, or numbers of organisms. The compensation value determined is added to the cost of primary restoration actions to make up the total restoration claim.

The final stages of the damage assessment and restoration process—restoration planning and implementation—have recently become more active. "More and more damage settlements are now being reached, and we are beginning to restore resources at more parks," says Tammy Whittington, manager of the Restoration Program Unit in Denver, which helps parks in planning and implementing restorations.

"The assessment and settlement phases are complex and time-consuming," says Whittington. "Settling a claim can take years. And then more planning is required before the actual physical restoration can occur. Most cases we get require not only a restoration plan but also National Environmental Policy Act compliance, public participation, and permits."

Nevertheless, Whittington and Hamson are encouraged by the number of new projects now in or entering the restoration phase. New initiatives include the restoration of tidal marshland at Golden Gate

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National Recreation Area (California), breakwater restoration at San Juan National Historic Site (Puerto Rico), dune reconstruction and habitat enhancement at Padre Island National Seashore (Texas), and shoreline stabilization and dock replacement projects at the USS Arizona Memorial Visitor Center (Hawaii).

The ERDAR program is also helping parks promote collaborative restoration efforts. One example is an ongoing series of workshops with the National Oceanic and Atmospheric Administration focusing on ways to better coordinate and collaborate on coral reef and seagrass restorations. This partnership is especially appealing to Canzanelli, who says, "The enhanced restoration program will significantly benefit Biscayne's vital coral reef and seagrass habitats." ■

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Protection through connection: The Resource Stewardship and Protection Curriculum

By Jeri Hall

“Population growth and ... illegal activity threaten park resources as never before. Theft and marketing of artifacts, animal parts, plant life, and other illegal commercial activities threaten to bleed away the vital resource base of the parks.”

—The Law Enforcement Program Study Report (2000),
NPS response to the National Parks Omnibus Management Act of 1998

THE CHALLENGE OF PROTECTING the natural and cultural resources of the national parks is complex and requires coordination of a variety of important functions. These include applying a high level of resource knowledge to park management, educating the public about park resources and their protection, and professionally enforcing resource laws. One especially troubling concern is the vulnerability of park resources to theft and trade. In response to these needs the National Park Service has engineered an interdisciplinary, six-course training curriculum for the professional development of staffs to play a more effective, coordinated role in resource protection. Known as the Resource Stewardship and Protection Curriculum, the training emphasizes the proactive protection of resources by integrating park rangers, resource managers, interpreters, facility managers, and others. Ironically, specialized training of these staffs over the past couple of decades has isolated them from one another. The team approach, however, is stimulating collaboration among different park operations and regions and proving to be an effective strategy for the protection of highly threatened park resources.

The curriculum has been developed by teams of interdisciplinary NPS field employees in partnership with the Eppley Institute for Parks and Public Lands of Indiana University. Since its beginnings in Yosemite National Park in 1999, the curriculum has gained support from several NPS regions and at the national level. In FY 2002 and 2003 it was funded by the Natural Resource Protection Fund of the Natural Resource Challenge and the Pacific West Region, allowing for the curriculum's evaluation and refinement, and delivery to audiences throughout the National Park Service. This program is one example of how the Natural Resource Challenge has reached out not just to the scientists but also to the law enforcement and maintenance staffs of the National Park Service. Growing support for the training is indicative of an exciting transformation in the Park Service to a shared sense of responsibility for the welfare of park resources.

Four courses have evolved that reflect a philosophy of interdisciplinary collaboration for enhanced resource protection, while two courses target NPS employees who hold law enforcement commis-

sions. “Introduction to Resource Stewardship,” the first course, was attended by 25 employees this year, raising the total number of participants to more than 180. The third course, “Intermediate Resource Protection for Interdisciplinary Teams,” was designed in 2003 in conjunction with Indiana University and presented in December to 25 participants. “Resource Stewardship for Protection Rangers,” the second course in the series, was offered in 2003 in a revised format and attended by 26 law enforcement rangers, bringing the total number of participants to have completed it over the past four years to 110. Additionally, instructor and student notebooks for this course were finalized.

The curriculum's success has led to the potential for its implementation nationally. A draft report detailing options for this expansion was developed this year. Additionally, course coordinators developed a video describing the curriculum's mission and positive outcomes for use in promoting it. Finally, a cooperative agreement is in place with Indiana University to continue development and evaluation of the courses through 2005.



The protection of park resources is a shared responsibility, and a training program begun in Yosemite National Park is catching on across the National Park Service and institutionalizing this concept. The Resource Stewardship and Protection Curriculum emphasizes the development of interdisciplinary teams of highly trained rangers and resource and facility managers to meet today's complex resource protection needs in the parks.

This effort presents a long-term, strategic approach for the training of NPS employees in the use of law enforcement and resource protection techniques for natural and cultural resources. The course work is already giving these staffs the essential competencies to build proactive resource protection programs throughout the National Park Service. Interdisciplinary partnerships among natural and cultural resource employees, visitor and resource protection rangers, and other NPS personnel are enhancing the application of field-based techniques to protect park resources. ■

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Great Lakes Research and Education Center celebrates successful first year

By Joy Marburger and Wendy Smith

IN ITS FIRST FULL YEAR of operation the Great Lakes Research and Education Center (GLREC), located at Indiana Dunes National Lakeshore, made tremendous progress toward its goals of facilitating outstanding research and education opportunities for its network parks. Research learning centers like this one are a key component of the Natural Resource Challenge because they involve a wide spectrum of Americans in opportunities to better understand our natural world and facilitate collaborative research efforts that benefit the parks. With this in mind the GLREC launched an array of research and education projects in 2003.

As with any new enterprise, much of the first year was spent making people aware of the center's services and potential. Joy Marburger, GLREC research coordinator, and Wendy Smith,

“Learning centers ... involve a wide spectrum of Americans in opportunities to better understand our natural world and facilitate collaborative research efforts that benefit the parks.”

GLREC education coordinator, began early on to network with researchers, managers, educators, and the public to promote natural resource research that addresses broad management issues in the Great Lakes Network parks. All the hard work resulted in a number of collaborative activities that use current research and are designed to benefit the parks.

Two research projects were established in 2003 at Indiana Dunes, Pictured Rocks, and Sleeping Bear Dunes National Lakeshores. The projects involved collaboration with other organizations and agencies. For example, researchers from the U.S. Geological Survey (USGS) and the Chicago Botanic Garden conducted research on the population genetics of Pitcher's thistle (*Cirsium pitcheri*), a federally threatened species. Another project explored the population genetics of marram beach grass (*Ammophila breviligulata*) and associated soil fungi, which was conducted by Chicago Botanic Garden and Cornell University researchers. Both projects will help park managers develop better freshwater beach restoration methods.

Collaborative research efforts are of clear value to national park managers. “The Great Lakes Research and Education Center's role in facilitating multi-park research projects definitely provides wider avenues for researchers to address national park management issues in a variety of disciplines,” according to Indiana Dunes National Lakeshore superintendent Dale Engquist.

The highlight of outreach activities involving multiple parks was a successful two-day purple loosestrife workshop held in Spooner,

research learning centers



Above right: Participants at an August 2003 workshop hosted by Great Lakes Research and Education Center learn hands-on survey and control methods for purple loosestrife, a nonnative plant, from USGS researcher Beth Middleton (top left). Controlling purple loosestrife is of special concern because it is highly invasive and forms dense stands that restrict native wetland plants and reduce habitat for waterfowl.

Bottom left: Robin Goettel, Illinois-Indiana Sea Grant communications coordinator, demonstrates a purple loosestrife invasion in a model wetland. Participants drew representative wetland plants and animals on paper, and purple confetti, representing dispersing seeds, was blown across the wetland with a fan.

Wisconsin, in late August 2003. Purple loosestrife (*Lythrum salicaria*) is a highly invasive, nonnative plant that forms dense stands that restrict native wetland plants and reduce habitat for waterfowl. The workshop was designed to foster interagency partnerships with Great Lakes national parks to integrate research information with hands-on survey and control methods, and to provide education and outreach tools to teachers and volunteers.

“Two research projects were established in 2003 at Indiana Dunes, Pictured Rocks, and Sleeping Bear Dunes National Lakeshores.”

Speakers represented a wide range of agencies and organizations and presented information from the perspectives of federal, state, and local concerns. Workshop participants also represented a broad range of stakeholders, including resource managers, interpreters, educators, researchers from nonprofit organizations, businesses, and concerned citizens. Many of the participants enthusiastically volunteered to assist with a USGS purple loosestrife monitoring project and Wisconsin’s biological control program. Workshop evaluations showed that people appreciated the interaction of speakers and participants from diverse areas, the flow of ideas among groups, the exploration of communication issues on purple loosestrife control,

and the opportunity to become involved in hands-on scientific research. The workshop was rated excellent or above average by 92% of the participants.

From facilitating research projects to hosting the purple loosestrife workshop, the GLREC has begun to fulfill its role as a field station for collaborative research and educational activities. In the years ahead it will continue to attract researchers to address a multitude of management issues facing Great Lakes parks and assist with development of related educational outreach programs. ■

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NPSFACT

Funding for natural resource management and research in the national parks more than doubled over the last 10 years, **from \$87.0 million in FY 1994 to \$191.0 million in FY 2003**. This dramatic increase includes \$67.4 million as a result of the Natural Resource Challenge. As a percentage of the budget for the operation of the National Park System (ONPS), natural resource management and research funding rose from **10.4% to 12.2%** over this period.

From guests to researchers: The adaptive reuse of McGraw Ranch

By Judy Visty

Research learning centers of the National Park Service combine the elements of field stations, partnerships, active support of research, and information transfer to fulfill the mandate of the Natural Resource Challenge. In September 2003, the Continental Divide Research Learning Center inaugurated its year-round residential campus located at the historic McGraw Ranch (photo) in Rocky Mountain National Park (Colorado).

A main focus of the research learning centers is to reuse existing facilities to provide expanded bed, office, and lab space for scientists and educators. In 1988, when the park acquired the McGraw Ranch property, it intended to raze the buildings and restore the land to elk and bighorn sheep habitat. A new superintendent at the time, Randy Jones, and a statewide outcry from preservationists led to a partnership with the National Trust for Historic Preservation. Fee demonstration funds, Colorado’s State Historical Fund, and donations



Visiting researchers to Rocky Mountain National Park are now able to bunk, prepare food, and use office facilities at the refurbished McGraw Ranch, the residential campus of the Continental Divide Research Learning Center.

from the National Trust, Rocky Mountain National Park Associates, and private individuals paid for the \$2 million project, which was completed in 2003.

Adding bunk beds may seem like an odd way to instigate government reform, but beds for visiting researchers are a key to ensuring their willingness and ability to come to parks to

do research. Most visiting researchers cannot afford the high temporary housing costs found near many national parks. And camping in a tent for several weeks may sound romantic but has limitations when fieldwork involves long hours, bad weather, and strenuous physical activity. A room with shared kitchen facilities allows a researcher to have a dry place to write up notes, eat, and get a good night’s sleep before going out and doing it all over again. The “field station” environment at McGraw Ranch also fosters information exchange with other scientists and park staff.

Further information on the Continental Divide Research Learning Center is available on the Web at <http://www.nps.gov/romo/education/CDRLC/index.html> or from the author (judy_visty@nps.gov, 970-586-1302). ■

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Examining Dyke Marsh restoration options: A teacher-scientist partnership in the National Capital Region

By Cathlyn Stylinski, Ph.D.

IT IS HOT AND HUMID at Dyke Marsh, the largest freshwater tidal wetland in metropolitan Washington, D.C., and a part of the George Washington Memorial Parkway, Virginia. A four-person research team slogs through the sucking mud and dense, tangled stands of cattails, impatiens, and morning glories. Their goal? To lay out a long transect and record plant species in several 1-meter plots. They locate each plot with a GPS unit and push short PVC tubes into the ground to collect samples of seeds stored in the black ooze. The research team is surveying the vegetation to examine restoration options for the marsh, which has been diminished by dredging and eroded shorelines.



Teacher fellow Darren Wilburn consults with researcher Steve Seagle on the identity of a wetland plant. Together with another teacher fellow (Mike Allred) and researcher (Katia Engelhardt), they are inventorying plants and seeds. The data they collect will help researchers develop a restoration plan for the marsh.

The group works well together, which might seem ordinary but for the fact that this is not a typical research team. Drs. Katia Engelhardt and Steven Seagle are seasoned scientists from the University of Maryland Center for Environmental Science–Appalachian Laboratory. Rounding out the team are two secondary school teachers from Maryland, who just a few weeks earlier did not know a spatterdock from an arrow arum and never considered that the seed bank is part of the vegetation community. What brought them together was an outreach program funded by the Urban Ecology Research Learning Alliance, the learning center of the NPS National Capital Region. Teacher fellows spend their summer working beside researchers and developing related classroom extensions of their experience. The program provides valuable support to NPS resource management projects while deepening the teachers' understanding of science research and critical natural resources like Dyke Marsh.

"I have a better understanding of how scientists do their job," says Mike Allred, a high school science teacher. "I learned that an incredible amount of work has to be done before setting foot in the field." Middle

school teacher Darren Wilburn adds, "I always thought of researchers as professors in white coats who had all the answers. But now I see that they're always learning and that they may not know the answers, but they know how to search for them."

"I've never worked with such highly motivated people," says Dr. Engelhardt. "The teachers quickly picked up on the project's goals and tasks and brought in their own creativity. It's truly a collaborative effort." Dr. Seagle agrees. "We couldn't have gathered as much data without their help."

With these data, the team is mapping the distribution of plant species at Dyke Marsh and exploring the effect of elevation and distance to tidal creeks on vegetation communities and seeds stored in the soil. This critical information will help determine whether marsh restoration efforts require intensive planting or if native plants will naturally recolonize from the seed bank.

Despite the oppressive summer conditions and scathing rice-cutgrass, the team is enthusiastic and excited about their work. "Dyke Marsh is such a valuable resource," says Mr. Allred. "It's so close to D.C., but lots of people don't know it exists." "Many people have a misconception that it's a mosquito breeding ground, so we should get rid of it," notes Mr. Wilburn. "But it's beautiful and so lush."

As part of their fellowship, the teachers are developing inquiry-based classroom applications that build on their National Park Service research experience. In Mr. Allred's classroom activity, students experiment with different factors that limit growth of hydrilla, an exotic, submerged plant that is invading many wetlands, including parts of Dyke Marsh. Mr. Wilburn is applying his new expertise in wetland ecology to bogs and fens in western Maryland. His students will use some of the same sampling techniques he learned at Dyke Marsh.

These teachers will also share their experience and activities with other educators online, in informal discussions, and at regional conferences. This successful outreach program of the Urban Ecology Research Learning Alliance and the University of Maryland Center for Environmental Science–Appalachian Laboratory will continue in summer 2004 with new teacher participants. ■

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Former naval base home to new research learning center at Acadia National Park

By John T. Kelly



A former navy base, the research learning center facilities at Acadia National Park are in the process of being converted to bunk, classroom, lodging, and lab space for visiting researchers and educators. In 2003 the center hosted more than a dozen researchers and conducted 13 residential education camps for more than 460 fifth through seventh grade students.

The timing of the Natural Resource Challenge and creation of NPS research learning centers was especially opportune for Acadia National Park, Maine. About the time that Acadia received approval for its research learning center, the U.S. Navy was preparing to close a base located within the Schoodic Peninsula section of the park. In 2002, the navy transferred the 100-acre (40-ha) base to the National Park Service. The former base is now home to the Schoodic Education and Research Center.

Acadia National Park is overcoming the challenge of converting more than 35 buildings from military to research and education use. The park is working with partners, such as the University of Maine, to create a niche for research and education that is unmatched in the region. The goal of the Schoodic Education and Research Center is to provide research and education benefits beyond the boundaries of the park. To meet this vision the center will facilitate education and research to promote the understanding, protection, and conservation of natural and cultural resources of the National Park System. It will also advance related research at the regional, national, and international levels.

In 2003, park managers began a strategy to attract partners to the research learning center and prepared a business plan that includes a market and economic viability analysis of the site. The park is also establishing an independent nonprofit organization to assist with the center's development and operation. The nonprofit will coordinate partners and manage center activities, while the park provides facility management and security for the campus. The park will expand the operation of Schoodic Education and Research Center with demonstration projects and other program activities in 2004. ■

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Park Planner, Acadia National Park, Maine

Landmark year for Cooperative Ecosystem Studies Units

By Jean E. McKendry and Gary E. Machlis

THE COOPERATIVE ECOSYSTEM STUDIES UNITS (CESUs) Network provides research, technical assistance, and education to federal resource management, environmental, and research agencies, and their partners. Each CESU is a collaboration of federal agencies, a host university, and partner institutions. Since June 1999, when the first four CESUs were established, the network has grown considerably.

By contemporary standards, the network is young and emerging. Yet, much has been accomplished between 1999 and 2003: 16 CESUs were competitively established and became operational, with the 17th (and final) CESU nearly completed (see map). Thirteen federal agencies from five departments—Interior, Agriculture, Commerce, Defense, and Energy—participate in the network. The 16 CESUs include 120 universities and colleges (25 participate in more than one CESU), and 22 of these universities and colleges are minority institutions: Historically Black Colleges and Universities, Native American Tribal Colleges, and Predominantly Hispanic Serving Institutions. The other 34 CESU partners range from Audubon of Florida and the American Indian Science and Engineering Society to the Missouri Botanical Garden and the Alaska Department of Fish and Game.

As the number of CESUs in the network has grown, so have the number and range of projects. By December 2001 and the close of the first inventory, 500 projects were catalogued as under way or completed; that number is now well over 1,000. Network projects range from small monitoring projects to a million-dollar restoration effort, incorporating expertise from the biological, physical, social, and cultural sciences, and many fields of cultural studies and the humanities.

In June 2003 the CESU Network held its Third Biennial National Meeting in Washington, D.C. More than 150 representatives from federal agencies, universities, and other partners across the country and across the CESU Network participated. The meeting included

"The National Park Service has been very active in the CESU network, contributing to its growth and maturation."

profiles of CESU projects and sessions on implementing CESUs, funding opportunities, and federal agency opportunities and needs. Most importantly, the meeting provided a chance for participants from newer CESUs to learn from the more experienced CESUs.

In addition to the growth of the CESU Network, much activity is related to maturation of individual CESUs. For example, almost every CESU has added partners (33 in all). Several CESUs have begun to hold joint meetings and share functions with one another. Contracting officials from participating federal agencies and universities have gained experience and applied their skills to moving projects forward. The first

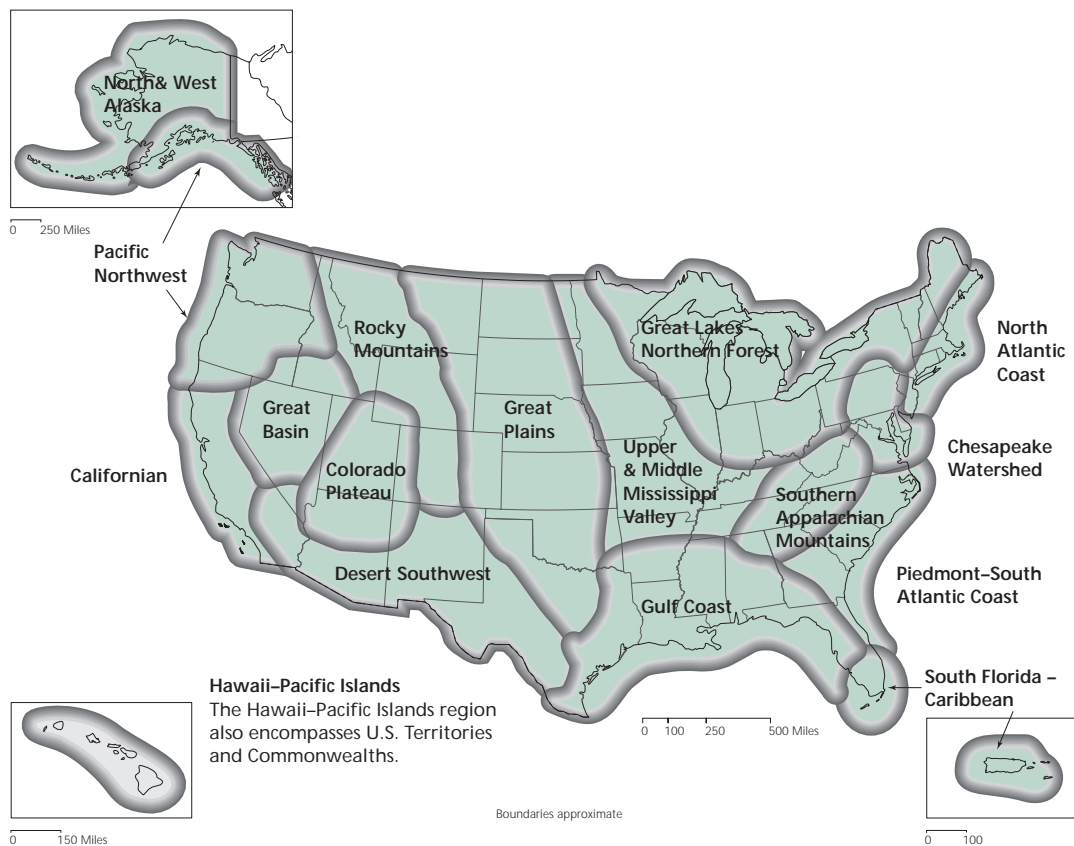
COOPERATIVE ECOSYSTEM STUDIES UNITS NETWORK

Sixteen Cooperative Ecosystem Studies Units were in operation in 2003, with the 17th and final CESU to be initiated in 2004 in Hawaii and the Pacific Islands.

- In the CESU Network
- Being established in FY 2004

Participating Federal Agencies:

Bureau of Land Management
Bureau of Reclamation
US Fish and Wildlife Service
US Geological Survey
National Park Service
Agricultural Research Service
USDA Forest Service
Natural Resources Conservation Service
National Marine Fisheries Service
Department of Defense
Department of Energy
Environmental Protection Agency
National Aeronautics and Space Administration



four CESUs will be up for renewal in 2004, and the CESU Council has established a renewal process that is both efficient and substantive, including self-assessment, independent review, minimal paperwork, and maximum confidence that CESUs operating effectively should be renewed.

A long-term strategy is also critical to the CESU Network. In spring 2003, after considerable input from federal agencies and a public comment period, the CESU Council released the CESU Network Strategic Plan for FY 2004–2008. This plan includes several important network initiatives, from advancing the information infrastructure of CESUs to encouraging multiagency, transboundary projects.

The National Park Service has been very active in the CESU Network, contributing to its growth and maturation. As part of the Natural Resource Challenge, the National Park Service placed coordinators at the host university for each of 12 CESUs, serving as “brokers”

to match park needs with university expertise and facilitate interagency collaboration. The Challenge also has provided funding for NPS projects at CESUs.

Cooperative Ecosystem Studies Units provide opportunities to create sound science and scholarship, give skillful public service, and deliver usable knowledge to federal agencies and their partners grappling with the environmental challenges of the 21st century. The first four years in the development of the network are evidence that these challenges can be overcome through the CESU Network as it continues to grow and mature. ■

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